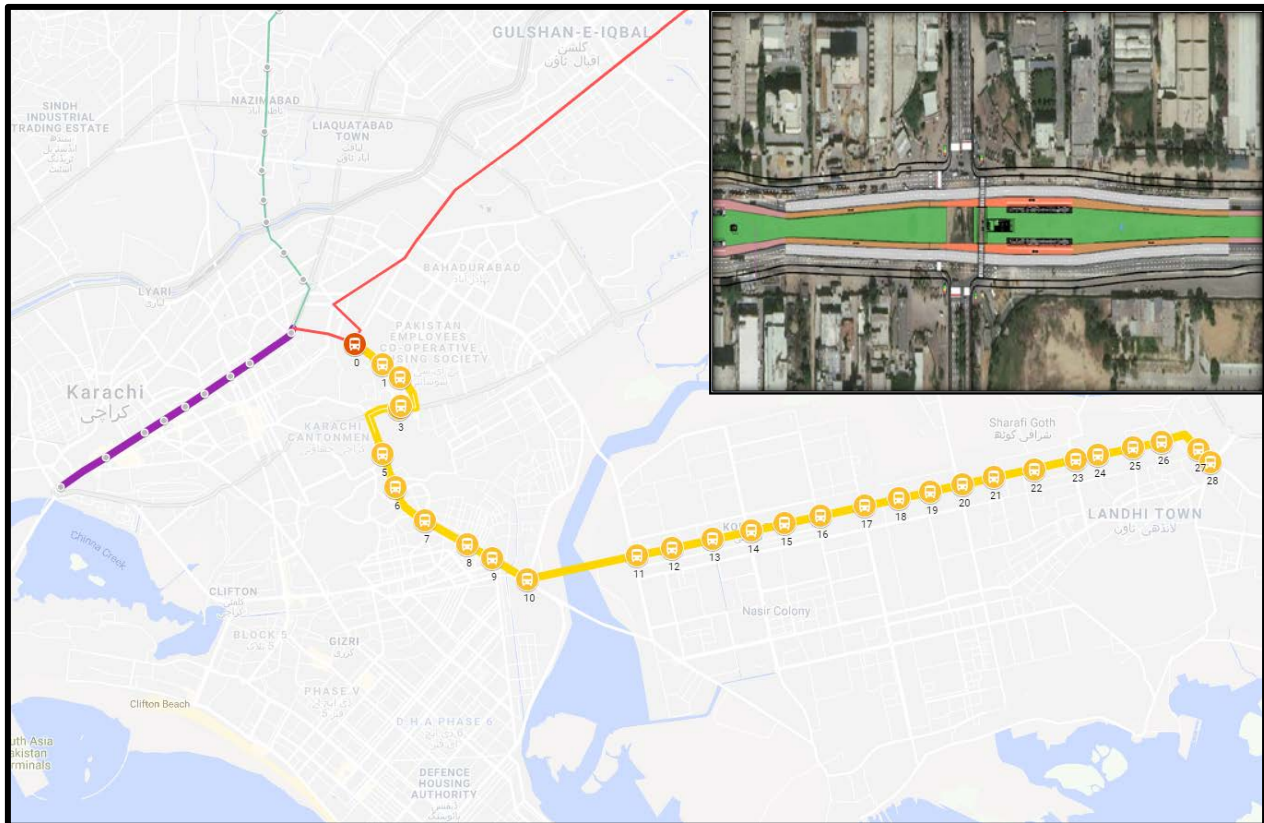


**SINDH MASS TRANSIT AUTHORITY
TRANSPORT & MASS TRANSIT DEPARTMENT
GOVERNMENT OF SINDH**



PC – I (Final)

(Based on Preliminary Design)

**KARACHI URBAN MOBILITY PROJECT
(YELLOW BRT CORRIDOR)**

DECEMBER 2019

List of Abbreviations

ADB	Asian Development Bank
ASA	Advisory Service and Analytics
AVL	Automatic Vehicle Location System
BRT	Bus Rapid Transit
C&LRP	Compensation and Livelihood Rehabilitation Plan
CBD	Central Business District
DMC	District Municipal Corporation
DRTA	District Regional Transport Authority
EIRR	Economic Internal Rate of Return
GoS	Government of Sindh
IBRD	International Bank for Reconstruction and Development
JICA	Japan International Cooperation Agency
KCR	Karachi Circular Railway
KE	K-Electric
KIDCL	Karachi Infrastructure Development Company Limited
KMC	Karachi Metropolitan Corporation
KTIP	Karachi Transportation Improvement Project
KUTMP	Karachi Urban Transport Master Plan
KW&SB	Karachi Water and Sewerage Board
LRT	Light Rail Transit
MRT	Mass Rapid Transit
NHA	National Highway Authority
NPV	Net Present Value
NTC	National Telecommunication Corporation
OCC	Operational Control Center
PAP	Project Affected People
PAX	Passengers
PPP	Public-Private Partnership
PTCL	Pakistan Telecommunication Company Limited
ROW	Right-of-Way
RTPI	Real Time Passenger Information
SMTA	Sindh Mass Transit Authority
SSGC	Sui Southern Gas Company
T&MTD	Transport and Mass Transit Department
WB	World Bank

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GOVERNMENT OF SINDH
PLANNING COMMISSION
(INFRASTRUCTURE SECTOR)

1	Name of the Project	Karachi Urban Mobility Project (Yellow BRT Corridor)
2	Location of the Project – Area Map	<p>The Yellow BRT corridor is developed primarily along Korangi and Korangi Industrial Roads connecting Karachi's: (i) southeastern suburbs (Korangi town, Landhi town, Bin Qasim town) characterized for being large and dense industrial and residential areas, (ii) southcentral districts (Clifton Cantonment, outer-Jamshed town) characterized by active and varied mixed land uses predominantly of residential and commercial types, and (iii) central districts (Karachi Cantonment, inner-Jamshed town and Saddar town) with thriving and dynamic commercial, institutional, residential, cultural, and religious activities coexist at higher levels of activity and density.</p> <p>The proposed corridor alignment follows the alignments of the following:</p> <ol style="list-style-type: none"> 1. Korangi Industrial Road (8000 Road) from Dawood Chowrangi in Landhi to Jam Sadiq Bridge. 2. Korangi Road from KPT Interchange to FTC Interchange. 3. Shahrah-e-Faisal, from FTC Interchange to Shahrah-e-Quaideen. 4. Shahrah-e-Quaideen from Shahrah-e-Faisal to Kashmir Road intersection (integration point with the Red BRT Corridor). <p>This project, as a fundamental component of Karachi's Mass Transit Network, contemplates the operational and functional integration with other BRT corridors as follows:</p> <ol style="list-style-type: none"> i) Common corridor and Karachi's Central Business District (CBD) at Numaish transit hub. ii) Red BRT corridor at Kashmir Road intersection along Shahrah-e-Quaideen. iii) Green, Orange and Blue BRT corridors at Numaish BRT hub. iv) Brown (LRT) corridor at Singer Chowrangi along 8000 Road. v) Karachi Circular Railway (KCR) at Kala Pull on Korangi Road and Landhi Railway Station nearby Dawood Chowrangi in Landhi. <p>For details on the Project's Geographical context please refer to Annexure-0.</p>
3	Authorities responsible for: i) Sponsoring	<p>Transport and Mass Transit Department (T&MTD) and Sindh Mass Transit Authority (SMTA), Government of Sindh with financial assistance from the World Bank (International Bank for Reconstruction - <i>IBRD</i>).</p>

	ii) Execution iii) Operation and Maintenance iv) Concerned Federal Ministry	<p>Sindh Mass Transit Authority (SMTA).</p> <p>Sindh Mass Transit Authority (SMTA) and Trans Karachi (Section 42 public sector company).</p> <p>Not Applicable.</p>
4	a) Plan Provision: i) If the project is included in the medium term / five-year plan, specify actual allocation.	<p>Not included.</p>
	ii) If not, then what warrants its inclusion and how is it now proposed to be accommodated	<p>The proposed Yellow BRT corridor is specifically defined as a core priority under the JICA Transportation Master Plan (Karachi Transport Improvement Plan (KTIP), 2030). The project also is closely aligned to the Federal Government's stated policies objectives with urban development and green growth. The Government's policy manifesto specifically calls for a transformational investment in Karachi:</p> <p><i>"Launch a transformation plan for Karachi – prioritizing governance, security, housing and infrastructure, mass transit, solid waste management and a clean drinking water plan." (First 100-Day Agenda, 2018, p. 9).</i></p> <p>The Government's policy manifesto also specifically notes the importance of addressing climate change mitigation through clean energy and sustainable transport:</p> <p><i>"We will develop an alternate economy, based on green growth with environmental care at the core; this will provide decent 'green' jobs and equip our country to face challenges of climate change and environmental pollution...We shall endeavor to deliver affordable and sustainable clean energy, promote clean transport, champion green infrastructure, effectively manage waste, promote efficient agriculture..." (The Road to Naya Pakistan, 2018, p. 49).</i></p> <p>The World Bank has recently proposed a Transformation Strategy for the City of Karachi following a comprehensive diagnostic analysis. The Karachi city diagnostic analysis underlined the structural nature of problems the city faces as it tries to improve its economy, livability, and inclusiveness. Failing to tackle these challenges in a timely and systematic manner would further exacerbate the urban infrastructure and service deficit in the city.</p> <p>A comprehensive programmatic, strategic, and phased approach is thus needed. Such an approach is fully aligned with the Karachi Strategic Development Plan (KSDP) 2020 and would consist of four tracks. This proposed project falls under Track 4 which calls for expenditures aimed at improving access to and the quality of</p>

		<p>service delivery, in such areas as water and sanitation civil works, urban and municipal road construction and maintenance, municipal solid waste, leveraging built heritage sites, public space development, safety and mobility, and green spaces management with a focus on disadvantaged neighborhoods. This project will also leverage private sector financing to meet Karachi's infrastructure needs, estimated by the World Bank to be US\$9 billion–US\$10 billion in financing over a 10-year period.</p> <p>The World Bank's commitment to Karachi's urban mobility improvement agenda and its interest in reengaging the urban transport dialogue and supporting the implementation of a mass transit system in the city launched mid-2017. An Advisory Service and Analytics activity (ASA – Support Karachi Urban Transport Program – Aug/17 to Feb/18 – US\$ 101,000/- WB grant) was executed with the development objectives of:</p> <ul style="list-style-type: none"> • Developing a common institutional, administrative and technical framework for the planning, design, implementation and operation of a comprehensive and integrated multi-modal public transport network for Karachi and; • Identifying and evaluating options for financing three BRT corridors (Blue, Yellow and Brown). <p>Under this umbrella, the WB mobilized experts to assess the urban transport subsector status – previous, ongoing and planned studies/initiatives, and measure overall project readiness with the potential of increasing its involvement towards an investment operation supporting near-term implementation of a mass transport project.</p> <p>The major achievement of this ASA was to re-engage in Karachi's Urban Transport Sector for the first time in 20+ years.</p> <p>Based on the findings of this initial engagement, the WB has advanced the dialogue by pursuing the preparation of an investment operation (Karachi Urban Mobility Project) supporting the implementation of the Yellow BRT corridor with the main development objective of improving mobility, accessibility and safety along selected corridors in Karachi.</p>
	iii) If not included in the current plan, if the project is proposed to be financed out of block provision, indicate.	Not applicable.
	b) Provision in the current year PSDP / ADP.	No provision.
5	Project Objectives:	The project's overarching objective is to improve mobility, accessibility and safety along the Yellow BRT corridor alignment

		<p>as described in numeral 2. Key results that will measure the achievement of the project's objective are as follows:</p> <ul style="list-style-type: none"> • Increase of ridership in quality public transport system with emphasis on increasing women ridership • Reduction of travel time for public transport passengers • Improvement of accessibility to jobs • Reduction of road traffic fatalities, especially for pedestrians and motorcyclists • Reduction of CO2 emissions from transport sources
	i) Objectives of the sector / sub sector as indicated in the medium term / five-year plan be reproduced.	Not Applicable.
	ii) Linkages of the project with other sectoral objectives.	<p>As part of the study for Karachi Transportation Improvement Project known as JICA Master Plan of 2012, a Karachi Urban Transport Master Plan (KUTMP 2030) was developed. KUTMP contemplates projects in road development and public transport subsectors.</p> <p>In road development, a total of 33 projects along arterial roads with total length of 306 km and maintenance of existing roads are considered.</p> <p>In public transport services provision, KUTMP identified key priority mass transit projects required to face Karachi's transport challenges and overcome the looming urban mobility crisis. KUTMP proposes the following mass transit investments:</p> <p>A. The revitalization of Karachi Circular Railway (KCR) on modern lines. B. 2 Mass Rapid Transit (MRT) corridors (Blue and Brown), C. 6 BRT corridors (Green, Red, Yellow, Orange, Aqua and Purple).</p> <p>As of December 2019, five corridors have been the object of study or are in course of implementation as follows:</p> <ol style="list-style-type: none"> 1) Green (financed by the Federal Government, implemented by Sindh Infrastructure Development Company Limited (SIDCL)), 2) Red (to be financed by the Asian Development Bank (ADB) and other development partners), 3) Orange (financed and in course of implementation by the GoS via SMTA), 4) Yellow (currently in appraisal and proposed to be financed by WB), and 5) Blue (a 2017 unsolicited proposal from the private sector developed a prefeasibility analysis for a BRT corridor

		<p>following design standards observed in the Green BRT Corridor).</p> <p>The Yellow Corridor project, as a fundamental component of Karachi's Mass Transit Network, contemplates the operational and functional integration with other BRT corridors as follows:</p> <ul style="list-style-type: none"> i) Common corridor (considered as the segment from Numaish to Merewether Tower) and Karachi's CBD at Numaish transit hub, ii) With Red BRT corridor at Kashmir Road intersection along Shahrah-e-Quaideen, iii) With Green, Orange and Blue BRT corridors at Numaish BRT hub, iv) With Brown (MRT) corridor at Singer Chowrangi along 8000 Road, and v) With KCR at Kala Pull on Korangi Road and Landhi Railway Station nearby Dawood Chowrangi in Landhi. <p>For details on the Project's Geographical context, please refer to Annexure-0.</p>
	iii) In case of revised Projects, indicate objectives of the project if different from original PC-I.	Not Applicable.
6	Description and Justification of the Project.	<p>1) Project Description</p> <p>a) Overall Project Structure</p> <ul style="list-style-type: none"> i) Component I: Urban Road Infrastructure along the Yellow BRT Corridor (24,069.2 million PKR of which expected IBRD financing is 22,257.4 million PKR and GoS financing of 1,811.8 million PKR). <p>This component will finance the rehabilitation or reconstruction of road infrastructure and related utilities improvement and shifting (e.g. street lighting, sewer/water supply, drainage, oil pipeline etc.). This component will also finance non-motorized transport facilities such as motorcycle lanes, footpaths and pedestrian crossing along the Yellow Corridor and its direct and feeder service routes.</p> <p>In addition, it will implement the recommendations and mitigation measures identified by Environmental Management, and Compensation and Livelihood Rehabilitation Plans prior and during construction. Furthermore, this component will finance detailed designs and construction supervision activities.</p> <ul style="list-style-type: none"> ii) Component II: The development and operationalization of a BRT System along the Yellow Corridor (36,392.7 million PKR, of which expected

		<p>IBRD financing is 30,582.7 million PKR, GoS 560.0 million PKR, and Private Sector 5,250 million PKR).</p> <p>This component will finance BRT infrastructure implementation, including segregated busways, interchange facilities, stations, terminal and depots, ITS and fare collection equipment along the Yellow Corridor. This component will also finance the capital cost of the BRT buses under a Concession Agreement with the private sector. A World Bank Guarantee will be explored to support the BRT system operation and maintenance along the Yellow Corridor using a Public Private Partnership (PPP) model. This Component will support the preparation of a TOD strategy along the Yellow Corridor.</p> <p>This component will also implement the social management plan including labor redeployment services, for the affected existing bus operators including drivers, conductors, owners along the Yellow Corridor and the Gender Action Plan, and a program of regular engagement with key stakeholders, and implementation of a public relations and media strategy for generating support and disseminating information on the BRT system.</p> <p>iii) Component III: This will finance Capacity Building and Technical Assistance (840 million PKR of which expected IBRD financing is 700 million PKR and GoS 140 million PKR). This component will finance project management cost, TA in road safety and traffic management, support to regional transport authorities in automating the management and monitoring of bus routes permits, and capacity building of SMTA.</p> <p>b) Yellow BRT Corridor Description</p> <p>The Yellow BRT corridor is developed primarily along Korangi and Korangi Industrial Roads connecting Karachi's:</p> <p>(i) Southeastern suburbs (Korangi, Landhi, Bin Qasim) characterized for being large and dense industrial and residential areas,</p> <p>(ii) Southcentral districts (Clifton Cantonment, outer-Jamshed town) characterized by active and varied mixed land uses predominantly of residential and commercial types, and</p> <p>(iii) Central districts (Karachi Cantonment, inner-Jamshed town and Saddar) with thriving and dynamic commercial, institutional, residential, cultural, and religious activities coexisting at higher levels of activity and density.</p> <p>Starting in Dawood Chowrangi in Landhi (southeast Karachi), the proposed corridor follows the alignments of the following:</p> <ol style="list-style-type: none"> 1. Korangi Industrial Road (8000 road) from Dawood Chowrangi in Landhi to Jam Sadiq Bridge. 2. Korangi Road from KPT Interchange to FTC Interchange. 3. Shahrah-e-Faisal, from FTC Interchange to Shahrah-e-Quaideen.
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		<p>4. Shahrah-e-Quaideen from Shahrah-e-Faisal to Kashmir Road intersection (integration point with the Red BRT Corridor).</p> <p>The project, as a fundamental component of Karachi's Mass Transit Network, contemplates the operational and functional integration with other BRT corridors as follows:</p> <ul style="list-style-type: none"> • Common corridor and Karachi's CBD at Numaish transit hub, • Red BRT corridor at Kashmir Road intersection along Shahrah-e-Quaideen, • Green, Orange and Blue BRT corridors at Numaish BRT hub, • Brown (MRT) corridor at Singer Chowrangi along 8000 Road, and • Karachi Circular Railway at Kala Pull on Korangi Road and Landhi Railway Station nearby Dawood Chowrangi in Landhi. <p>c) Design Premise</p> <p>The infrastructure design premise focused primarily, whenever possible, and upon verification of compliance with operational requirements obtained from the agreed service plan, on two fronts:</p> <ol style="list-style-type: none"> i. Minimization of disruptions to existing dwellers and number of people affected by the project – land acquisition and relocation requirements; and ii. Maximization of accessibility, multimodal integration facilitation, and increased connectivity due to project implementation – prioritization of at-grade corridor insertion and pedestrian/NMT friendly design. <p>d) Characteristics</p> <ol style="list-style-type: none"> i) Length – 21 km: <ul style="list-style-type: none"> • 20 km with dedicated BRT lanes and • 1 km under mixed traffic (KPT interchange, FTC Interchange, and Shahrah-e-Faisal), ii) Vertical insertion – 16% underground and 84% at-grade, iii) Horizontal insertion median-aligned BRT lanes with 26 median aligned “central” stations and 2 bi-lateral “curbside” stations (Shahrah-e-Faisal), iv) Stations – 28: <ul style="list-style-type: none"> • 7 Type A – At-grade with underground pedestrian crossing,
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		<ul style="list-style-type: none">• 1 Type B – At-grade with elevated pedestrian crossing• 3 Type C – Split median-aligned at-grade with at-grade pedestrian crossing• 2 Type D – Split curb-aligned at-grade with elevated pedestrian crossing• 6 Type D – Underpass with at-grade pedestrian crossing• 9 Type E - At-grade with at grade crossing <p>v) Depots – 2: Dawood Chowrangi and Christian Colony on Landhi Road.</p> <p>e) ROW and Existing cross sections</p> <p>ROW availability is generous along the Yellow Corridor. A six (6) lane road layout has been ensured for approximately 80% of the alignment with exceptions where complex interchanges (Shahrah-e-Faisal, KPT Interchange, FTC Interchange and Jam Sadiq Bridge) or constrained sections (Future Colony into Dawood Chowrangi) actively reduce the available ROW.</p>								
		<p>f) Bus Fleet (Rolling Stock)</p> <p>The bus fleet proposed for the Yellow BRT System, as per the operational requirements obtained from the latest service plan completed as part of the PC-1's preparatory study, consists of two low-emission low-entry bus typologies: 12m (capacity of 75 passengers (pax)) and 18m (capacity of 125 pax). The total fleet size, as per the latest service plan (subject to change), for the project is 268 (248 + 20 reserve i.e. 8% of the vehicle fleet) Diesel-Hybrid vehicles.</p> <p>Table 1: Fleet Size and Types</p> <table><tr><th>Bus Type</th><th>No. of Buses</th></tr><tr><td>12 m vehicles</td><td>117</td></tr><tr><td>18 m vehicles</td><td>131</td></tr><tr><td>Total</td><td>268</td></tr></table> <p>The selected technology for the BRT vehicles is Diesel Hybrid – conventional hybrid electric (batteries charged through regenerative braking). The vehicle body shape will feature a modern and aerodynamic design for increased fuel efficiency.</p>	Bus Type	No. of Buses	12 m vehicles	117	18 m vehicles	131	Total	268
Bus Type	No. of Buses									
12 m vehicles	117									
18 m vehicles	131									
Total	268									
		<p>g) ITS Equipment</p> <p>The ITS system comprised of the following components:</p> <p>i) Fare System</p> <p>The Fare System comprises of all equipment to collect fares from</p>								

		<p>passengers through sales of fare cards and tickets and enforcing the validation of the same through access control barriers and inspection by staff.</p> <p>ii) Fleet Management (FM) / Automatic Vehicle Location (AVL) System</p> <p>The FM/AVL system comprises of vehicle-borne units with a display for drivers, and a central system in the Operational Control Center (OCC) being constructed under the Green corridor BRT project at Garden. With a single OCC serving all Karachi BRT services, the vehicle borne AVL units must be integrated with the OCC planning and dispatching systems.</p> <p>iii) Real Time Passenger Information (RTPI)</p> <p>The RTPI source information is expected to come from the central OCC systems in an internationally standardized format. "Next bus" displays will be installed on all Station platforms, and a large display will be installed in the station main concourse showing the next buses and interconnections expected to arrive on the station.</p> <p>iv) Security and Surveillance System</p> <p>CCTV cameras will be installed along the corridor providing day and night surveillance. In addition, all buses will be covered with CCTV cameras and the stations themselves will be fully covered including high risk areas such as the ticket kiosks. Prior to platform entry, passengers will be required to pass a walk-through metal detector.</p> <p>v) Communication Network</p> <p>A fiber optic network will interconnect all stations, OCC and depots. Inside the stations, devices are connected using ethernet LAN, all terminating in a protected cabinet on the station. Vehicle-OCC communication may be realized through 3G/4G mobile connection or alternatively a WiFi mesh network as proposed for the Green BRT corridor may be utilized.</p> <p>Voice communications is both through IP-phones, mobile connections and a UHF/VHF system may be employed to connect reliably to mobile units. However, interoperability with the other corridors should be ensured.</p> <p>Cost Breakup of ITS Equipment is attached at Annexure-V.</p>
		<p>h) Relocation of Utilities</p> <p>The relocation of utilities is a critical element in the execution of an urban infrastructure project. The preemptive measures to identify the quantum and types of utility are vital to negotiate project delays that may occur due to the relocation of utilities. Cost for Relocation of Utilities will be excluded from project Civil Works Cost and will be 100% borne by GoS. The purpose is to coordinate with all the concerned authorities that operate, manage and maintain the utilities passing through the Yellow BRT corridor. These include, but not limited to, Karachi Water and Sewerage Board (KW&SB), K-Electric (KE), Sui Southern Gas Company (SSGC), Pakistan Telecommunication Company</p>

		<p>Limited (PTCL), National Telecommunication Corporation (NTC), and other concerned authorities.</p> <p>i) Compensation and Livelihood Rehabilitation Plan (C&LRP)</p> <p>The BRT system will be developed within the existing ROW without the need of land acquisition. However, the project will impact 120 Project Affected People (PAP) including informal vendors, skilled labors and plant nurseries owners and employees. The affected vendors run their businesses on public land (ROW) without any legal permission or license. The survey identified 19 vulnerable households, which includes 3 disabled and 16 below poverty line.</p> <p>The C&LRP assistance is expected to restore the living standards of PAPs. It is planned that a transitional business loss allowance for a period of 12 months will be provided to PAPs. Such transitional support/allowance will be based on their net monthly income to offset the business losses during construction phase. In addition to compensation, opportunities for project-based job or training will be provided to PAPs.</p> <p>The livelihood rehabilitation assistance for affected vendors is estimated to be 29.80 million PKR. Of this total amount, 28.89 million PKR is required for income losses during the transition period of informal vendors/ employees and vulnerability allowance to vulnerable Project affected households of 0.91 million PKR will be spent.</p> <p>The C&LRP implementation schedule will be based on readiness level of the Yellow BRT corridor final design and commencement of the construction work.</p> <p>The SMTA will prepare and submit semi-annual monitoring reports to World Bank as part of project implementation performance monitoring.</p> <p>Cost Breakup of C&LRP is attached at Annexure-VII.</p> <p>j) Social Management Plan - Existing Bus Operators</p> <p>The Project will negatively impact existing public transport operators including owners and employees because their routes have to be either closed or shortened in order to be compatible with the BRT routes and avoid competition on the same routes.</p> <ul style="list-style-type: none"> • A detailed survey will be carried out about one (1) year prior to start of BRT operation in order to have a detailed account of the affected people, their income and a detailed entitlement matrix will be developed to offset their income losses, • Public buses will be bought and auctioned or scrapped and will not be allowed to ply on the proposed BRT route, • An attempt will be done to incorporate the affected people in the private BRT Operation Company,
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		<ul style="list-style-type: none"> • For those who can't be incorporated in the BRT Company, Cash compensation equal to one (1) year of income will be paid to transport owners and employees to compensate their income losses, and • Labor Redeployment Services will be offered to people who lost their job, on top of cash compensation, to expedite their re-entry into the labor market.
		<p>2) Project Justification</p> <p>Citizens of Karachi rely almost entirely on the road network for travel within the city. The city has approximately 10,000 kilometers of roads, with local roads accounting for roughly 93 percent and highways and arterial roads for less than five (5) percent of the total length. Karachi also has six (6) arterial or trunk roads that extend radially from the central area.</p> <p>There is currently no mass transit system per se. There are nearly 13.5 million motorized trips made each day within the city, of which about 42 percent are made by public and 58 percent by private transport. There were 3.6 million registered vehicles in Karachi as of mid-2015 (over 30 percent of the national total), and private vehicles—mainly motorcycles and cars—constitute about 84 percent of total registered vehicles, while public transport accounts for 4.5 percent of the total registered vehicles. With growth rates for private vehicles at over 4 percent, there are now over 1,000 new vehicles added to the streets of the city each day. There were over 12,000 public transport vehicles (including buses, minibuses, and coaches) serving 267 routes in the city. However, the number of buses has been steadily decreasing and has reached less than 5,000 in 2017 serving only about 100 routes. A city of the scale of Karachi should have at least 15,000 modern buses.</p> <p>Women have a particularly low economic participation rate in Karachi, only 8%, due to the lack of affordable, safe and secure transport that they can use. According to JICA Household Survey, the female ridership in public transport was less than 15%. The GoS has addressed this issue in its “Vision 2025” plan which targeted a 45% economic participation for women. This will require massive improvements in public and non-motorized transport suitable for their use.</p> <p>The analysis of household data collected in a JICA-sponsored study (2012) indicates that jobs in Karachi are highly concentrated within the inner city. These centrally located jobs are often high skill, “white collar” jobs while employment opportunities for people with much lower skills and education requirements are much more dispersed. As the city expands to accommodate a growing population, poor increasingly live at the periphery. Travel from their low density, sprawling housing locations in the far suburbs to the equally spread out locations with suitable employment opportunities is costly and time consuming. This limits employment possibilities for the poor, especially women. City’s extremely high vulnerability to natural and climate-related disasters, including recurrent floods</p>

		<p>(due to poor drainage) and future sea level rising, adds another layer of complication to its urban mobility challenges.</p> <p>As part of the study for Karachi Transportation Improvement Project known as JICA Master Plan of 2012, a Karachi Urban Transport Master Plan (KUTMP 2030) was developed. KUTMP included projects in the road sector as well, including 33 projects along arterial roads with total length of 306 km and maintenance of existing roads. KUTMP has also identified priority mass transit projects that Karachi needs to undertake to overcome the looming urban mobility crisis.</p> <p>These recommendations focused on immediate and future needs for which implementation steps were to be taken. KUTMP proposed 2 Metro Rail Transit (MRT) corridors (KCR and KCR extension), 4 Light Rail Transit (LRT) corridors (Blue, Brown, Yellow and Silver), and 5 BRT corridors (Green, Red, Orange, Purple and Aqua). KUTMP prioritized the implementation of the KCR, and the Green, Orange, Red, Blue and Yellow corridors. Due to financial consideration, the GoS decided to implement all 5 of the highest priority corridors as BRT.</p> <p>The Green BRT is financed by the Federal Government and is being implemented by Karachi Infrastructure Development Company Limited (KIDCL), its infrastructure is almost completed and KIDCL is planning to involve the private sector in operating its bus services. The Red BRT will be financed by the Asian Development Bank (ADB) and other partners, it is in appraisal stage. The Orange BRT is financed and implemented by the GoS via SMTA and is 50% completed.</p> <p>In Karachi, urban infrastructure and service delivery is fragmented among national, provincial and local governments. In recent years, many core city services have been centralized under the Government of Sindh (GoS) like solid waste, water and sewerage, mass transit, land use and building control, among others. Local councils represented by Karachi Metropolitan Corporation (KMC) and the six District Municipal Corporations (DMCs) deliver basic services in Karachi but suffer from limited financial resources and institutional and governance weaknesses. This institutional fragmentation and unclear or overlapping responsibilities have led to a deteriorating situation where basic urban services are not even delivered.</p> <p>Multiple government departments and authorities are dealing with transport in the city with little coordination among them. Various bodies—such as the National Highway Authority (NHA), GoS, KMC, KDA, DHA, and cantonments—administer roads in Karachi. KMC is responsible for the administration of over 40 percent of roads in the city. The Transport and Mass Transit Department is the principal planning, regulatory, and implementing body of GoS responsible for dealing with all urban transport matters at the provincial level.</p> <p>Currently, responsibilities for major roads transport and traffic management within the city are shared between KMC and KDA. Fares for public transport are regulated by the Transport and Mass Transit Department under GoS. The District Regional Transport Authority (DRTA) issues route permission for public</p>
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	<p>transport in Karachi. However, the decision making for the permission is governed by a board, with representation from the police, city government, and Provincial Transport Authority and DRTA. The Public-Private Partnership (PPP) unit of the GoS is also assisting the Transport and Mass Transport Department in the development of mass transit initiatives in Karachi.</p> <p>The Mass Transport Authority act of 2014 created the Sindh Mass Transit Authority (SMTA) but it was only initiated in early 2018. The Authority has just been made functional and is under resourced. It has yet to build sufficient human and other resources to plan/implement a mass transit system in Karachi.</p> <p>3) Beneficiaries It is estimated that more than 700,000 people will benefit from this project, particularly people living and working along Surjani Town (Green Corridor) and Korangi Industrial area (Yellow Corridor). The Yellow BRT Corridor project will effectively connect these two catchment areas while improving the safe and secure accessibility of women and people with limited mobility to jobs and other economic activities.</p> <p>The mapping of employment opportunities suggest that these opportunities are centered along the BRT route. The analysis of household trip surveys collected in a JICA-sponsored study (2012) indicates that job opportunities in Karachi are highly concentrated within the catchment area of the BRT corridor. The highest concentration of jobs can be found in Bilal Colony (Korangi). About 50% (135,000 out of 270,000) of all work trips that end in Bilal Colony originate along the BRT corridor.</p> <p>The increase in employment opportunities is also expected to be positive for women. Despite progress in recent years on equity, women continue to live and work at a disadvantage. Women's economic participation is significantly lower than men. According to JICA Household Survey (2010), female employees accounted for only 5% (2,595) and the female ridership in public transport was less than 15% of the total ridership.</p> <p>The project will also focus on:</p> <ul style="list-style-type: none"> • Climate change adaptation and mitigation measures, and other environmental Co-Benefits by promoting a modal shift in road users from polluting transport modes (e.g. old, poorly maintained buses and motorcycles) to lower carbon sustainable modes (e.g. cleaner BRT buses and non-motorized transport), and • Providing resilient transport infrastructure and increasing the capacity of authorities to deal with disaster situations.
	<p>Technical Parameters</p> <p>Technical parameters which need to be considered for the desired project objectives are given below:</p>

		<p>a. Design Specifications of Yellow BRT Corridor</p> <p>i. Route Length for BRT Corridor</p> <p>Length of at-grade section = 17.6 km</p> <p>Length of elevated section = Nil</p> <p>Length of underpass section = 3.4 km</p> <p>ii. BRT Stations</p> <p>Total No. of at-grade Bus Stations = 22</p> <p>Total No. of elevated Bus Stations = Nil</p> <p>Total No. of underpass Bus Stations = 6</p> <p>iii. BRT Operational / Geometric Design Speed</p> <p>BRT Speed = 50 kph</p> <p>b. Dedicated Lane Structure of Yellow BRT Corridor</p> <p>i. Width at Station</p> <p>BRT lane (passing) = 3.5 m</p> <p>BRT lane (docking) = 3.0 m</p> <p>BRT station = 3.5 m to 5.0 m</p> <p>Lane delineator = 0.5 m to 0.6 m</p> <p>ii. Width at off-Station Lanes</p> <p>BRT lane = 3.5 m</p> <p>BRT central shy = 0.3 m both side of centerline</p> <p>Lane delineator = 0.6 m</p> <p>iii. Maximum pavement cross slope</p> <p>Maximum pavement cross slope on carriageway and BRT lanes = 2%</p> <p>c. Non-motorized Transport</p> <p>i. Sidewalk</p> <p>Width = 1.5 m to 5 m</p> <p>Length = 42 km (both sides throughout)</p> <p>ii. Motorbike Track</p> <p>Width = 3 m</p> <p>Length = 21 km (both sides)</p> <p>d. Drains</p> <p>i. Retention Cells size for New System</p>
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		<div>1.2 m x 1.5 m</div> <div><div>ii. Rehabilitation of existing Drain</div><div>1.2 m X 1.5 m</div></div> <div><div>e. Bus Fleet (Rolling Stock)</div><div>The bus fleet proposed for the Yellow BRT System, as per the operational requirements obtained from the latest service plan completed as part of the PC-1's preparatory study, consists of two low-emission low-entry bus typologies: 12m (capacity of 75 passengers (pax)) and 18m (capacity of 125 pax). The total fleet size, as per the latest service plan (subject to change), for the project is 268 (248 + 20 reserve i.e. 8% of the vehicle fleet) Diesel-Hybrid vehicles.</div></div> <div><div>f. Off-Corridor Infrastructure interventions</div><div>The off-corridor interventions cost is approximately 5% of the total estimate for the project’s civil works. A preliminary visual inspection of these road segments indicate that the infrastructure required comprises the following:</div><div><div><div>• Off-corridor bus shelters</div><div>• Existing road rehabilitation/repair</div></div></div></div>																				
<div>Project Specific Information</div>		<div>Additional project specific information is given below:</div> <div><div>Structures</div><div>The following are the proposed bridges, underpasses and overhead U-Turn on the project:</div><div><div>Table 2: Proposed Bridges / Underpasses / U-turns</div><table><tr><th>New Bridges</th><th>Underpasses</th></tr><tr><td>Jam Sadiq Bridge</td><td>Murtaza Chowrangi</td></tr><tr><td>Kala Pull Bridge (new bridge after demolition of existing south side bridge)</td><td>Singer Chowrangi</td></tr><tr><td></td><td>Bilal Chowrangi</td></tr><tr><td></td><td>Vita Chowrangi</td></tr><tr><td></td><td>Shan Chowrangi</td></tr><tr><td></td><td>Brooks Chowrangi</td></tr><tr><td></td><td>Khayaban-e-Ittehad</td></tr><tr><td></td><td>Sunset Boulevard</td></tr><tr><td></td><td>Tariq Road</td></tr></table><div><div>Overhead U-Turn</div><div>Near Sunset Boulevard Intersection along Korangi Road</div></div></div></div> <div>In addition, the existing bridge at Jam Sadiq will be rehabilitated under this project.</div> <div>Preliminary Design drawings are attached at Annexure – III.</div>	New Bridges	Underpasses	Jam Sadiq Bridge	Murtaza Chowrangi	Kala Pull Bridge (new bridge after demolition of existing south side bridge)	Singer Chowrangi		Bilal Chowrangi		Vita Chowrangi		Shan Chowrangi		Brooks Chowrangi		Khayaban-e-Ittehad		Sunset Boulevard		Tariq Road
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7	Capital Cost Estimate	<p>The estimated cost breakup of the project is given in Table 3 below.</p> <p>Table 3: Capital Cost Estimate Summary</p> <table><tr><th rowspan="2"><u>Project Costs</u></th><th colspan="2"><i>(million)</i></th></tr><tr><th>USD¹ \$</th><th>PKR</th></tr><tr><td>1 Urban Road Infrastructure</td><td>172.0</td><td>24,069.3</td></tr><tr><td>a. Yellow Corridor</td><td>117.0</td><td>16,374.7</td></tr><tr><td>b. Off-Corridor improvements</td><td>12.1</td><td>1,696.7</td></tr><tr><td>c. Utilities relocation²</td><td>10.7</td><td>1,494.1</td></tr><tr><td>d. Vendors Compensation Plan</td><td>0.5</td><td>70.0</td></tr><tr><td>e. Environmental Management Plan</td><td>3.0</td><td>420.0</td></tr><tr><td>f. Detailed design, Bidding documents and construction supervision</td><td>15.0</td><td>2,105.1</td></tr><tr><td>g. Third Party Monitoring</td><td>0.7</td><td>101.5</td></tr><tr><td>h. Physical Contingencies</td><td>6.5</td><td>903.6</td></tr><tr><td>i. Price Contingencies</td><td>6.5</td><td>903.6</td></tr><tr><td>2 Development and Operationalization of a BRT System</td><td>259.9</td><td>36,392.8</td></tr><tr><td>a. BRT Infrastructure (busways, stations, depots)</td><td>118.1</td><td>16,532.3</td></tr><tr><td>b. ITS, Fare collection and other equipment</td><td>42.9</td><td>6,004.1</td></tr><tr><td>c. Rolling stock</td><td>75.0</td><td>10,500.0</td></tr><tr><td>d. Social Management Plan – Compensation for Existing Bus Operators</td><td>4.0</td><td>560.0</td></tr><tr><td>e. TA for GBV and Gender Action Plan</td><td>0.5</td><td>70.0</td></tr><tr><td>f. TOD strategy along the Yellow BRT corridor alignment and area of influence</td><td>1.0</td><td>140.0</td></tr><tr><td>g. TA – PPP Transaction Advisory Services</td><td>0.5</td><td>70.0</td></tr><tr><td>h. Stakeholder engagement, public relation and media strategy</td><td>1.0</td><td>140.0</td></tr><tr><td>i. Physical Contingencies³</td><td>8.0</td><td>1,126.8</td></tr><tr><td>j. Price Contingencies⁴</td><td>8.9</td><td>1,249.6</td></tr><tr><td>3 Capacity Building and Technical Assistance</td><td>6.0</td><td>840.0</td></tr><tr><td>a. Project Management</td><td>2.0</td><td>280.0</td></tr><tr><td>b. TA – Traffic management and Road Safety</td><td>1.0</td><td>140.0</td></tr><tr><td>c. TA – Regional Transport Authority</td><td>1.0</td><td>140.0</td></tr><tr><td>d. Capacity building to SMTA and Institutional Strengthening</td><td>2.0</td><td>280.0</td></tr><tr><td>Front End Fee (0.25% of IBRD loan)</td><td>1.0</td><td>133.9</td></tr><tr><td>Total Project Cost (1+2+3 + FEF)</td><td>438.9</td><td>61,436.0</td></tr></table> <p><i>Imprecision in totals may exist due to decimal rounding</i></p> <p>¹ Equivalent currency</p> <p>² To be financed by the Government of Sindh</p>	<u>Project Costs</u>	<i>(million)</i>		USD ¹ \$	PKR	1 Urban Road Infrastructure	172.0	24,069.3	a. Yellow Corridor	117.0	16,374.7	b. Off-Corridor improvements	12.1	1,696.7	c. Utilities relocation ²	10.7	1,494.1	d. Vendors Compensation Plan	0.5	70.0	e. Environmental Management Plan	3.0	420.0	f. Detailed design, Bidding documents and construction supervision	15.0	2,105.1	g. Third Party Monitoring	0.7	101.5	h. Physical Contingencies	6.5	903.6	i. Price Contingencies	6.5	903.6	2 Development and Operationalization of a BRT System	259.9	36,392.8	a. BRT Infrastructure (busways, stations, depots)	118.1	16,532.3	b. ITS, Fare collection and other equipment	42.9	6,004.1	c. Rolling stock	75.0	10,500.0	d. Social Management Plan – Compensation for Existing Bus Operators	4.0	560.0	e. TA for GBV and Gender Action Plan	0.5	70.0	f. TOD strategy along the Yellow BRT corridor alignment and area of influence	1.0	140.0	g. TA – PPP Transaction Advisory Services	0.5	70.0	h. Stakeholder engagement, public relation and media strategy	1.0	140.0	i. Physical Contingencies ³	8.0	1,126.8	j. Price Contingencies ⁴	8.9	1,249.6	3 Capacity Building and Technical Assistance	6.0	840.0	a. Project Management	2.0	280.0	b. TA – Traffic management and Road Safety	1.0	140.0	c. TA – Regional Transport Authority	1.0	140.0	d. Capacity building to SMTA and Institutional Strengthening	2.0	280.0	Front End Fee (0.25% of IBRD loan)	1.0	133.9	Total Project Cost (1+2+3 + FEF)	438.9	61,436.0
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		<p>³ Physical contingencies computed at 5% for civil works (excluding utilities' relocation) and equipment.</p> <p>⁴ Price contingencies computed at, on average, 1.525% on foreign exchange costs and 4.825% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate. Price contingencies' computation is based on expected cumulative inflation over the implementation period, such as follows:</p> <p>Escalation Rates for Price Contingency Calculation:</p> <table><tr><th>Item</th><th>2018</th><th>2019</th><th>2020</th><th>2021</th><th>Average</th></tr><tr><td>Foreign rate of price inflation</td><td>1.5%</td><td>1.5%</td><td>1.5%</td><td>1.6%</td><td>1.525%</td></tr><tr><td>Domestic rate of price inflation</td><td>4.5%</td><td>4.8%</td><td>5.0%</td><td>5.0%</td><td>4.825%</td></tr></table>	Item	2018	2019	2020	2021	Average	Foreign rate of price inflation	1.5%	1.5%	1.5%	1.6%	1.525%	Domestic rate of price inflation	4.5%	4.8%	5.0%	5.0%	4.825%										
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	Date of Estimation	The date of cost estimation is March 2019.																												
	Basis of Cost Determination	<p>The cost estimate of the engineering works is primarily based on the Composite Schedule of Rates 2014, for Sindh of the National Highway Authority (scheduled rates). An adjustment factor of 29.88% was added to cater for inflation and cost increase of items since 2014. The formula used to calculate it is presented below:</p> <p>Yearly Average Inflation for 2015 (Jan to Dec) = 4.71%. Yearly Average Inflation for 2016 (Jan to Dec) = 4.71%. Yearly Average Inflation for 2017 (Jan to Dec) = 5.425%. Yearly Average Inflation for 2018 (Jan to Dec) = 6.00%. Yearly Average Inflation for 2019 (Jan to Dec) = 6.00%.</p> <p>AF= (1+4.71%) *(1+4.71%) *(1+5.425%) *(1+6.00%) *(1+6.00%) = 1.2988 equivalent to 29.88% increase.</p> <p>Rates for non-schedule items were derived from current market rates, for which Rate Analysis (RA) is attached.</p> <p>Cost estimates of utilities were obtained from the respective authorities. However, the payment shall be made to the respective utility authority on the actual work done basis.</p>																												
	Year-wise drawdown estimates.	<p>The year wise budget estimates are given in Table 4 below:</p> <p>Table 4: Year-wise Budget Estimate</p> <table><tr><th colspan="7">Budget (PKR Million)</th></tr><tr><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Year 6</th><th>Year 7</th></tr><tr><th>(2020 – 2021)</th><th>(2021 – 2022)</th><th>(2022 – 2023)</th><th>(2023 – 2024)</th><th>(2024 – 2025)</th><th>(2025- 2026)</th><th>(2026- 2027)</th></tr><tr><td>1,386</td><td>5,600</td><td>18,340</td><td>12,600</td><td>11,200</td><td>9,800</td><td>2,380</td></tr></table> <p><i>Imprecision in totals may exist due to decimal rounding</i></p>	Budget (PKR Million)							Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	(2020 – 2021)	(2021 – 2022)	(2022 – 2023)	(2023 – 2024)	(2024 – 2025)	(2025- 2026)	(2026- 2027)	1,386	5,600	18,340	12,600	11,200	9,800	2,380
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8	Annual Operating and Maintenance Cost after completion of project.	<p>Anticipated project annual operating and maintenance cost is shown in Table 5 below.</p> <p>Table 5: Anticipated Annual Opex Costs</p> <table><tr><th></th><th>PKR Million</th></tr><tr><td>Opex – Payments to BRT Vehicle Operator</td><td>(3,542)</td></tr><tr><td>Opex – Payments to System Control Service Provider</td><td>(976)</td></tr><tr><td>Opex – Payments to Fund Manager</td><td>(21)</td></tr><tr><td>Opex – TransKarachi staff</td><td>(307)</td></tr><tr><td>Opex – Overheads</td><td>(66)</td></tr><tr><td>Sales tax on services paid</td><td>(127)</td></tr><tr><td>Operating Cash Flow</td><td>(1,174)</td></tr></table> <p>Refer to Financial Model attached at Annexure-I for details.</p>		PKR Million	Opex – Payments to BRT Vehicle Operator	(3,542)	Opex – Payments to System Control Service Provider	(976)	Opex – Payments to Fund Manager	(21)	Opex – TransKarachi staff	(307)	Opex – Overheads	(66)	Sales tax on services paid	(127)	Operating Cash Flow	(1,174)		
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Operating Cash Flow	(1,174)																			
9	Demand Supply Analysis.	<p>The estimated demand is 300,000 passengers per day. (Refer to Operational Plan attached at Annexure-I).</p>																		
10	Financial Plan and Sources of Financing.	<p>Table 6 below shows the financing plan / share for the project.</p> <p>Table 6: Financing Plan</p> <table><tr><th rowspan="2">Currency</th><th colspan="3">Share* (Million)</th><th rowspan="2">Total</th></tr><tr><th>WB IBRD/</th><th>GOS</th><th>Private Sector</th></tr><tr><td>USD (Millions)</td><td>382.4</td><td>19.0</td><td>37.5</td><td>438.9</td></tr><tr><td>PKR (Millions)</td><td>53,540.1</td><td>2,645.9</td><td>5,250.0</td><td>61,436.0</td></tr></table> <p><i>* The proposed WB financing is subject to processing timeline and requirements, and final confirmation from WB Board.</i></p> <p><i>The Private sector share represents the likely equity in BRT buses, to be confirmed based on the PPP transaction advisory results for BRT operation which will be carried out later.</i></p> <p><i>The government in-kind contribution of land for the two depot sites is not included in the above table.</i></p> <p><i>The conversion rate of USD to PKR is 140.</i></p> <p><i>Imprecision in totals may exist due to decimal rounding</i></p> <p>Refer Annexure-V for details.</p>	Currency	Share* (Million)			Total	WB IBRD/	GOS	Private Sector	USD (Millions)	382.4	19.0	37.5	438.9	PKR (Millions)	53,540.1	2,645.9	5,250.0	61,436.0
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11	<p>Project Benefits and Analysis</p> <p>a) Project Benefits</p> <p>i) Financial Benefits</p> <p>ii) Economic Benefits</p> <p>iii) Social Benefits with Indicators</p>	<p>Nil</p> <p>The major economic benefits of the project are:</p> <ol style="list-style-type: none"> User travel time savings; Vehicle operating cost savings; Vehicle emissions savings; and Road crash savings due to improved driving standard by bus driver as well as provision of dedicated lane which minimize conflicts between buses and other road users. <p>Additionally, indirect benefits will be obtained such as better walking and cycling environment, better access to quality public transport system. During construction, there might be some dis-benefit for road users, due to disruption of traffic and flows of the buses along the BRT corridor.</p> <p>For details on the Economic Analysis refer to Annexure-I.</p> <p>The proposed project would address the transportation needs of expansive population and employment growth, transportation and economic development initiatives. Specifically, the project would improve accessibility, mobility, transit travel times, safety and reliability, and passenger facilities from Dawood Chowrangi to Numaish which will become one of the heavily transit corridor.</p> <p>It is estimated that approximately 700,000 people will benefit from this project, particularly people living and working along Surjani Town and Korangi industrial area. According to JICA study, Korangi Industrial Area has the highest employment density in Karachi i.e. more than 60,000 persons per sq.km. The project will improve the safe and secure accessibility of women and people with limited mobility to jobs and other economic activities.</p> <p>It is estimated that over the next 20-years period following the project completion, about 1,700 lives will be saved and 15,000 serious injuries will be avoided due to better road safety conditions along the corridor.</p> <p>The Project will also create direct and indirect employment opportunities and will promote the development of a safe and sustainable public transport system to the beneficiaries, which will indirectly sustain the GoS efforts in inclusive and environmentally sound growth in Karachi.</p>
	<p>iv) Environmental Impacts</p>	<p><u>During Construction:</u></p> <ul style="list-style-type: none"> Electric Pylons. Safety hazards for human beings due to the location of electric pylons at the corridor

		<ul style="list-style-type: none"> • Wastewater overflow. Causing nuisance, odor, soil pollution and outbreak of diseases due to clogging of wastewater drains at project site during construction • Flooding at the corridor due to heavy rainfall • Vegetation. Contribute in city's air pollution and disturbance to the aesthetic and landscaping of the area due to cutting of trees, plants, bushes, green areas during relocation of utilities, construction of roads and establishing construction camps • Physical Cultural Resources (PCRs). Chances of the loss of PCRs at the project sites during excavation • Air Quality. Resulting in poor visibility, loss of vegetation, property damages, and health implications on workers and nearby community due to fugitive emissions of dust (SPM, PM10, PM2.5), asphalt fumes, stack and vehicular emissions during construction activities. • Wastewater. Soil and water contamination, odor, health implications on workers and community (due to breeding of mosquitos and flies), and nuisance due to improper treatment and disposal of sanitary wastewater from construction camps. • Solid waste, soil and noise • Occupational Health and Safety of project workers • Traffic congestion <p><u>During Operations:</u></p> <ul style="list-style-type: none"> • Reduction in CO2 emission <p>Carbon emission reductions and other emission reductions were calculated. Data on the VKT, ridership, and modal split with and without the project were taken from the traffic model and the emissions impacts for various bus alternatives were then evaluated in terms of tons reduced per year. Fuel efficiency and carbon dioxide (CO2) emission factors were updated for Pakistan for a typical vehicle mix in Pakistan. On average, the BRT project reduced on average 46,081 tons of CO2 per year (875,547 tons over 20-years), well-to-wheel. The value per ton of reduced emissions was taken from the World Bank. The average annual economic value of the reduced emissions is \$3.8 million, using Diesel-hybrid buses.</p> <ul style="list-style-type: none"> • Noise, soil contamination, emission from generators, land use impact. <p>Cost Breakup for Environmental Management Plan is attached in Annexure-VI.</p>
	b) Project Analysis i) Financial Analysis	The Financial Analysis is presented in Annexure-I.

	<ul style="list-style-type: none">▪ Quantifiable output	A financial model was developed based on the selected operational plan for the Yellow BRT corridor, i.e. distance-based fares and a fleet composed of 12 and 18-meter vehicles. The private sector margin is assumed at 25%. The extent of the Private sector equity in the Project is a major factor affecting the results of the financial analysis. Based on the financial analysis together with the advantage of bundling bus procurement and operation under one concession contract, the Private sector will provide 50% of bus cost and the GoS the other 50% from the World Bank loan.						
	<ul style="list-style-type: none">▪ P & L and CF statements▪ Net Present Value (NPV)▪ Benefit Cost Ratio (BCR)▪ Internal Financial Rate of Return (FIRR)▪ Unit Cost Analysis▪ Break Even Point (BEP)▪ Payback Period	<p>System Cash Flows in First Year of Operation (Nominal Values, 2021) is presented in Annexure-I.</p> <p>The initial capital investment is financed by the government of Sindh under World Bank loan and offered to the project as a subsidy. The revenues of the system are not expected to recover the capital investment cost.</p> <p>The initial capital investment is financed by the government of Sindh under World Bank loan and offered to the project as a subsidy. The revenues of the system are not expected to recover the capital investment cost.</p> <p>The initial capital investment is financed by the Government of Sindh under WB loan and offered to the project as a subsidy. The revenues of the system are not expected to recover the capital investment cost.</p> <p>Under the current service plan, ridership and costing and fuel type assumptions, the kilometer charges to be paid by Karachi BRT Company to the BRT Vehicle Operators are estimated to be as follows:</p> <p>Table 7: Bus kilometer Charge</p> <table><tr><th></th><th>PKR</th></tr><tr><td>Bus-kilometer charge (at operations start) – 12m</td><td>161.4</td></tr><tr><td>Bus-kilometer charge (at operations start) – 18m</td><td>195.1</td></tr></table> <p>The real kilometer charges ultimately payable by Karachi BRT Company will only be known at the end of the open competitive bidding process for the BRT Vehicle Operator contract(s).</p> <p>The initial capital investment is financed by the government of Sindh using a World Bank loan and offered to the project as a subsidy. The revenues of the system are not expected to recover the capital investment cost.</p> <p>The initial capital investment is financed by the government of Sindh using a World Bank loan and offered to the project as a</p>		PKR	Bus-kilometer charge (at operations start) – 12m	161.4	Bus-kilometer charge (at operations start) – 18m	195.1
	PKR							
Bus-kilometer charge (at operations start) – 12m	161.4							
Bus-kilometer charge (at operations start) – 18m	195.1							

		subsidy. The revenues of the system are not expected to recover the capital investment cost.										
	<ul style="list-style-type: none">▪ Return on Equity (ROE)	The initial capital investment is financed by the government of Sindh using a World Bank loan and offered to the project as a subsidy. The revenues of the system are not expected to recover the capital investment cost.										
	c) Economic Analysis i) Taxes and duties in the capital operating cost ii) Net Present Value (NPV) iii) Benefit Cost Ratio iv) Internal Economic Rate of Return (EIRR)	<p>The details of Economic Analysis are presented in Annexure-I.</p> <p>Taxes and duties, financial charges during construction, and price contingencies were excluded from the calculation of economic costs. Financial costs were converted to economic costs in line with World Bank Guidelines. A distinction was made between traded and non-traded goods, and a shadow exchange rate factor of 1.039 was applied to traded goods. A shadow wage rate factor of 0.85 was estimated and applied to unskilled labor.</p> <p>USD 372 million / PKR 52,080 million.</p> <p>1.80.</p> <p>17%.</p>										
	d) Employment Analysis i) Direct employment generation ii) Indirect employment generation	<p>It is anticipated that the direct employment to be generated via execution of the project will be more than 2,000 jobs.</p> <p>According to accessibility analysis done, there are about 700,000 jobs located within the catchment area of the Yellow Corridor service plan. By developing the Yellow BRT corridor, it is anticipated that around 2% of Indirect Employment will be generated by the development which is around 14,000 jobs.</p>										
	e) Sensitivity Analysis Impact of delays on cost and viability	<p>Table 8 below shows the impact of one (1) year delay on cost and project viability.</p> <p>Table 8: Impact of delays on Cost and Viability</p> <table><tr><th></th><th>Construction Delay (1 year)</th></tr><tr><td>EIRR</td><td>14%</td></tr><tr><td>Net Present Value (PKR millions)</td><td>39,480</td></tr><tr><td>Net Present Value (\$ millions)</td><td>282</td></tr><tr><td>Benefit-Cost Ratio</td><td>1.71</td></tr></table>		Construction Delay (1 year)	EIRR	14%	Net Present Value (PKR millions)	39,480	Net Present Value (\$ millions)	282	Benefit-Cost Ratio	1.71
	Construction Delay (1 year)											
EIRR	14%											
Net Present Value (PKR millions)	39,480											
Net Present Value (\$ millions)	282											
Benefit-Cost Ratio	1.71											

12	<p>Implementation Schedule and RBM indicators</p> <p>a) Implementation Schedule</p> <p>i) Indicate starting and completion date of the project</p> <p>ii) Item-wise / year-wise implementation schedule in line chart correlated with the phasing of physical activities</p> <p>b) Result Based Monitoring indicators (RBM)</p> <p>c)</p>	<p>The project construction is expected to start in the second quarter of 2022 and finish in the first quarter of 2025 (42-month contract). The concession agreement for the Private BRT Operator will be signed around June 2023 so the buses can be delivered in Q4 2024 and prior to project completion.</p> <p>The implementation schedule is provided in Annexure–VIII.</p> <p>The Results Framework is provided in Annexure–IV.</p>																											
13	<p>Management Structure and Manpower Requirements</p> <p>Administrative arrangements for implementation of project.</p> <p>The manpower requirements by skills during execution and operation of the project be provided.</p>	<p>Sindh Mass Transit Authority (SMTA) has been established by enacting the “Mass Transit Authority Act”.</p> <p>TransKarachi has been established as a Section 42 public sector company to implement mass transit projects and manage their future operations, as delegated by SMTA.</p> <p>The following table 9 provides manpower requirements for execution and one-year defect liability period in the Project Management Team (PMT).</p> <p>Table 9: Manpower Requirements for PMT</p> <table border="1"> <thead> <tr> <th>S. No.</th><th>Designation</th><th>Quantity</th></tr> </thead> <tbody> <tr> <td>1.</td><td>Project Director</td><td>1</td></tr> <tr> <td>2.</td><td>Director Planning & Design</td><td>1</td></tr> <tr> <td>3.</td><td>DD Technical / Executive Engineer</td><td>2</td></tr> <tr> <td>4.</td><td>Director Procurement & Contracts</td><td>1</td></tr> <tr> <td>5.</td><td>DD Procurement & Contracts (Works)</td><td>1</td></tr> <tr> <td>6.</td><td>Director Environment and Social Safeguards</td><td>1</td></tr> <tr> <td>7.</td><td>AD Environment</td><td>1</td></tr> <tr> <td>8.</td><td>AD Resettlement</td><td>1</td></tr> </tbody> </table>	S. No.	Designation	Quantity	1.	Project Director	1	2.	Director Planning & Design	1	3.	DD Technical / Executive Engineer	2	4.	Director Procurement & Contracts	1	5.	DD Procurement & Contracts (Works)	1	6.	Director Environment and Social Safeguards	1	7.	AD Environment	1	8.	AD Resettlement	1
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14	Computer Operator	2																								
15	Admin Staff (office assistants; helpers, drivers, etc.)	8																								
TOTAL PMU Staff		26																								
14	Additional projects/decisions required to maximize socio-economic benefits from the proposed project.	<ul style="list-style-type: none"> • Implement the Compensation and Livelihood Rehabilitations Plan, • Prohibit illegal parking along project corridor, • Enforce the traffic laws, and • Implement the public transport route reorganization that will be proposed prior to the start of BRT operation to eliminate competition and incentivize modal complementarity. BRT passenger ridership will thus be maximized by (i) capturing captive public transport demand and (ii) encouraging modal shift on catchment areas. 																								

- 15. Certified that the project proposal has been prepared on the basis of instructions given by the Planning Commission for preparation of the PC-I for the Infrastructure Sector Projects.**

Prepared by: M/s NESPAK
(Chief Engineer – NESPAK, 021-99090638)

Checked by: _____
(Director Projects, SMTA)

(Director Bus Operations, SMTA)

Recommended by: _____
(Managing Director, SMTA)

Approved by: _____
(Secretary Transport & Mass Transit Department,
Government of Sindh)

Counter-signed by: _____
(Chairman, Planning & Development Board,
Government of Sindh)

ANNEXURES

ANNEXURE–0

Geographical context

Corridor Alignment:



Figure-1: Geographical Context of Yellow, Red, Green and Common (purple indicative) BRT Corridors

Depots:

Total capacities are based on suggested internal distribution indicative of disaggregated totals per vehicle typology. Staging arrangements can thus be reviewed based on actual needs per typology.

1. Landhi Depot (East)

A 12,286.81 m² lot east of the Dawood Chowrangi terminal station (junction between Korangi and Landhi roads) with direct access to Korangi Road. Conveniently, the lot (highlighted in blue in Figure-2 below) is currently operating as a maintenance and parking facility for public transport vehicles under Government of Sindh's management. The total capacity at the depot is for 80 buses (46 18-m and 34 12-m).

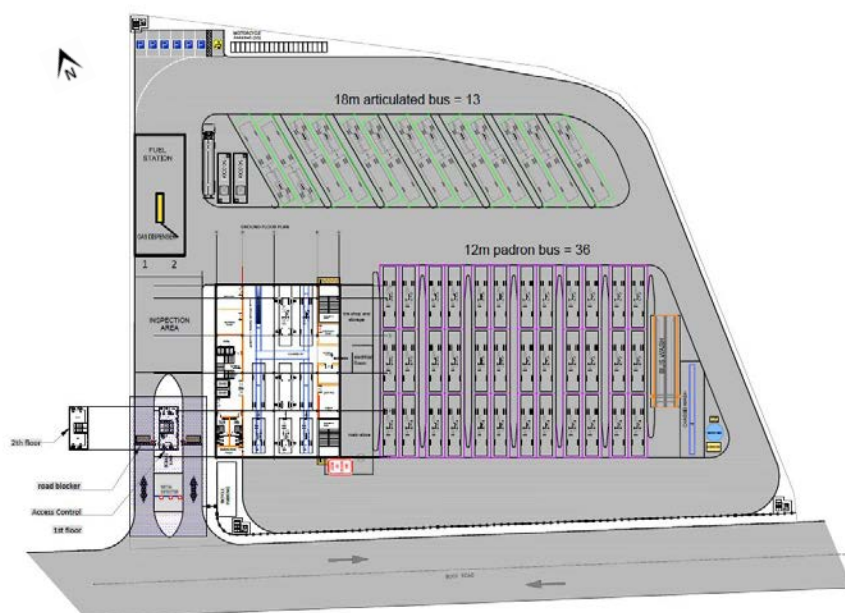
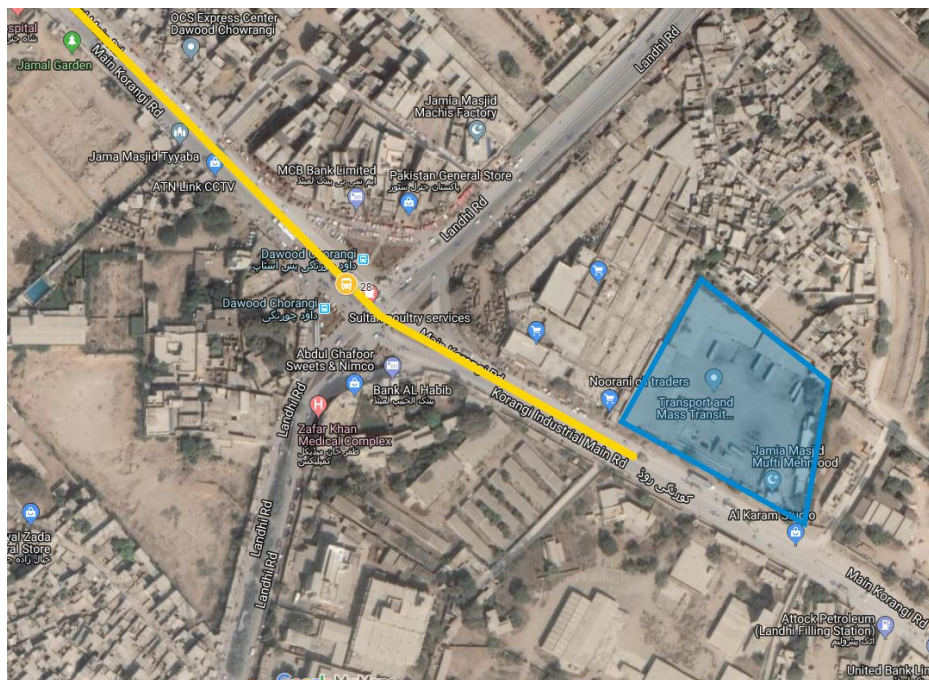


Figure-2: Proposed Yellow BRT corridor Landhi bus depot location and design

2. Christian Colony Depot (South)

A 37,118.57 m² lot south of 8000 road on Landhi Road with total capacity of 186 buses (108 articulated and 78 standard).

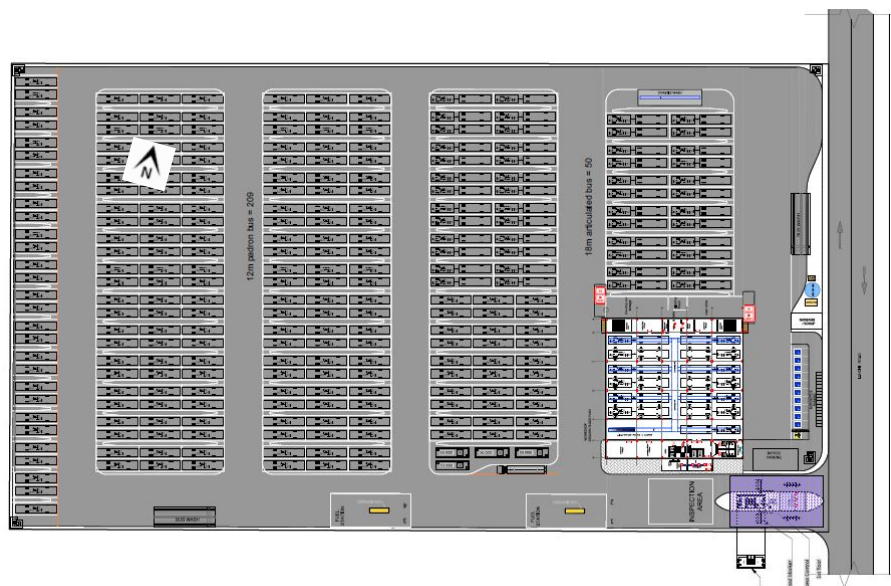


Figure-3: Proposed Yellow BRT corridor Christian Colony bus depot location and design

ANNEXURE–I

Feasibility Analysis

ANNEXURE-II

**Specific infrastructure arrangements –
Korangi Road cross sections and 8000
Road cross section and intersection
design proposal**

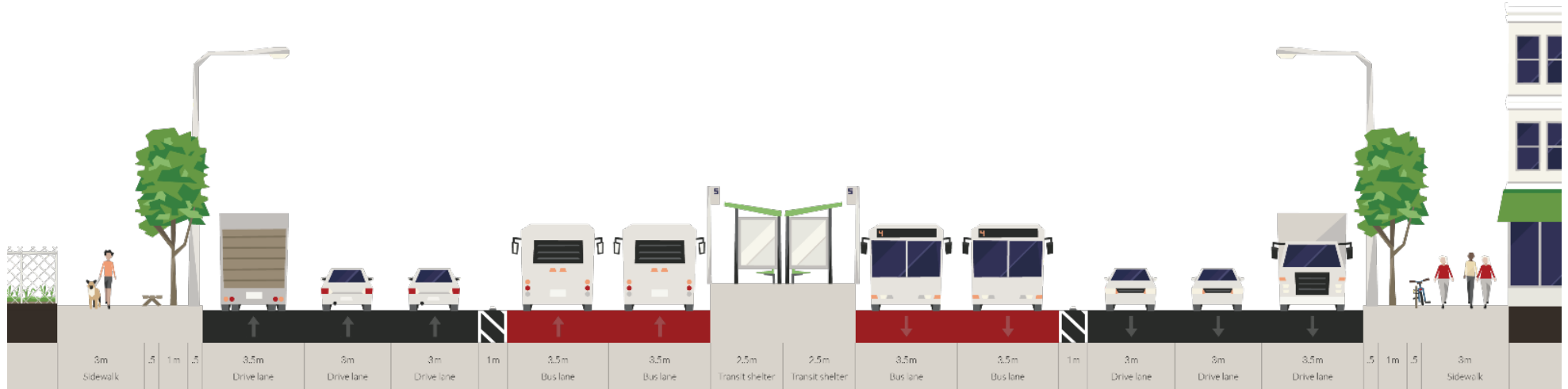


Figure-4: Typical cross section at-station

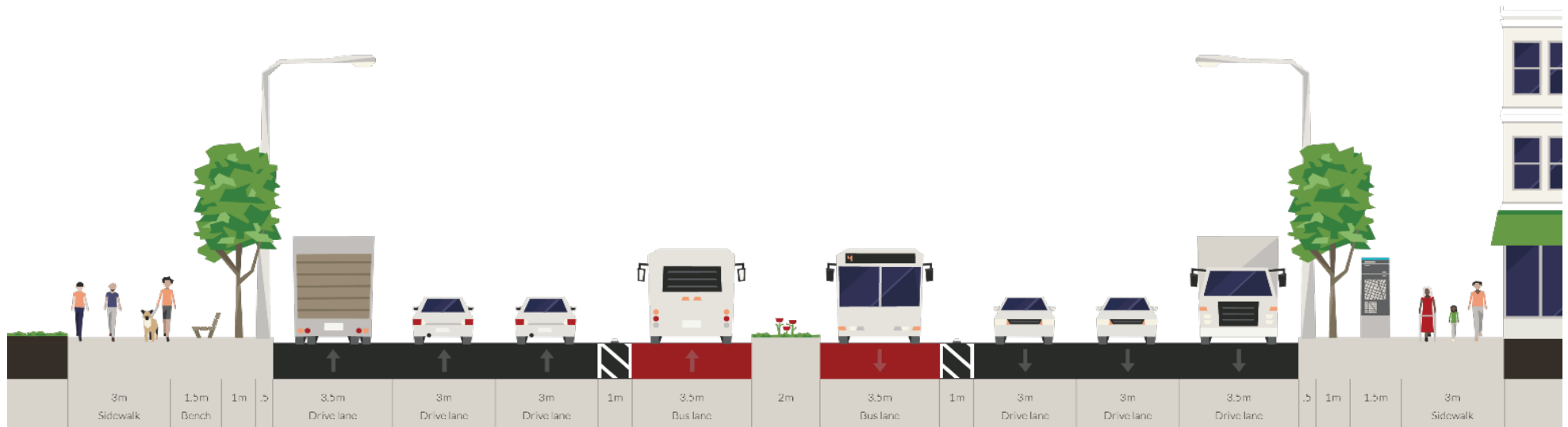


Figure-5: Cross section at off-station locations

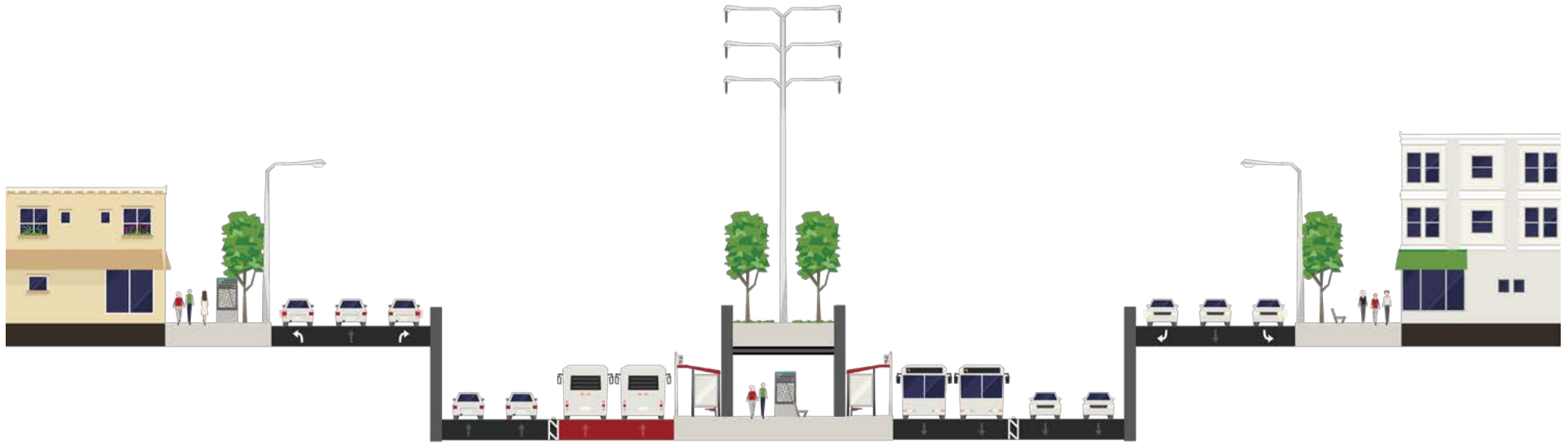


Figure-6: At-station cross section along Korangi Industrial Road (8000 Road)

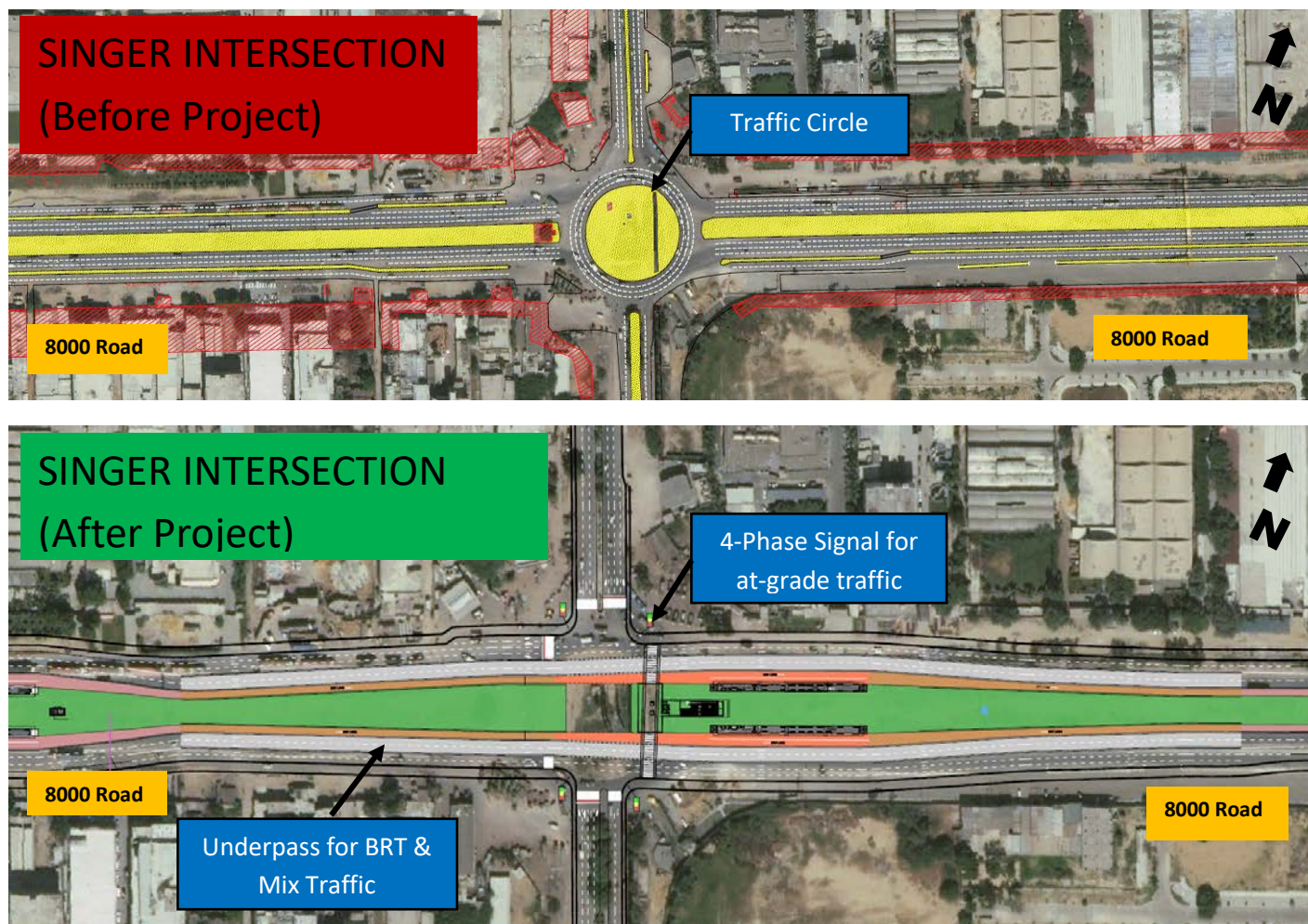


Figure-7: Before and After Project Scenario (8000 Road)

ANNEXURE–III

Preliminary Design Drawings

(All drawings are available separately)

ANNEXURE–IV

Results Framework

Project Development Objectives(s)

The Project Development Objective is to improve mobility, accessibility and safety along selected corridors in Karachi.

Project Development Objective Indicators

Indicator Name	DLI	Baseline	End Target
Improve Urban Mobility			
Daily Number of Public Transport Trips on the Bus Rapid Transit System (Number)		0.00	300,000
Female ridership (Percentage)		0.00	30.00
Improve Urban Accessibility			
Urban Accessibility Index (Percentage)		14.10	25.70
Improve Urban Traffic Safety			
Number of Traffic Fatalities along the Yellow Corridor (Number)		100.00	50.00

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	End Target
Urban Road Infrastructure			
Roads rehabilitated (CRI, Kilometers)		0.00	21.00
Roads rehabilitated - non-rural (CRI, Kilometers)		0.00	21.00
Development and Operationalization of a BRT System			
Length of BRT Corridor (Kilometers)		0.00	21.00
Number of BRT Stations (Number)		0.00	28.00
Capacity Building and Technical Assistance			
Number of professional staff recruited by SMTA on merit basis		0.00	18.00
Completion and adoption of strategy to consolidate and improve the		No	Yes

Indicator Name	DLI	Baseline	End Target
management of Urban Transport Sector in Karachi (Yes/No)			
Completion of the corridor development strategy focusing on Transit Oriented Development (Yes/No)		No	Yes

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	Definition / Description	Frequency	Data Source	Methodology for Data Collection	Responsibility for Data Collection
Daily Number of Public Transport Trips on the Bus Rapid Transit System Female ridership	Daily ridership on the BRT system along the yellow corridor on various type of services (trunk, feeder or direct).	Monthly	SMTA using Private Operator data	Fare system	Private sector operating the BRT system.
Urban Accessibility Index	% of jobs accessible within a 60-minute commute using PT & walking.				
Number of Traffic Fatalities along the Yellow Corridor	Number of traffic fatalities along the Yellow BRT Corridor.	Annual	Traffic Police		

ANNEXURE–V

Project Cost Breakup

(All Cost Estimates and Rate Analysis are available separately)

Table 10: Project Financing Plan

Project Costs		(million)		IBRD Share		GoS Share		Private Sector Share	
		Total		Total		Total		Total	
		USD \$	PKR	USD \$	PKR	USD \$	PKR	USD \$	PKR
1	Urban Road Infrastructure	171.9	24,069.2	159.0	22,257.4	12.9	1,811.8	-	-
a.	Yellow Corridor	117.0	16,374.7	114.9	16,085.8	2.1	288.9	-	-
b.	Off-Corridor improvements	12.1	1,696.7	12.1	1,696.7	-	-	-	-
c.	Utilities relocation ²	10.7	1,494.1	-	-	10.7	1,494.1	-	-
d.	Vendors Compensation Plan	0.5	70.0	0.5	70.0	-	-	-	-
e.	Environmental Management Plan	3.0	420.0	3.0	420.0	-	-	-	-
f.	Detailed design, Bidding documents and construction supervision	15.0	2,105.1	15.0	2,105.1	-	-	-	-
g.	Third Party Monitoring	0.7	101.5	0.7	101.5	-	-	-	-
h.	Physical Contingencies	6.5	903.6	6.4	889.1	0.1	14.4	-	-
i.	Price Contingencies	6.5	903.6	6.4	889.1	0.1	14.4	-	-
2	Development and Operationalization of a BRT System	259.9	36,392.7	218.4	30,582.7	4.0	560.0	37.5	5,250.0
a.	BRT Infrastructure (busways, stations, depots)	118.1	16,532.3	118.1	16,532.3	-	-	-	-
b.	ITS, Fare collection and other equipment	42.9	6,004.1	42.9	6,004.1	-	-	-	-
c.	Rolling stock	75.0	10,500.0	37.5	5,250.0	-	-	37.5	5,250.0
d.	Social Management Plan – Compensation for Existing Bus Operators	4.0	560.0	-	-	4.0	560.0	-	-
e.	TA for GBV and Gender Action Plan	0.5	70.0	0.5	70.0	-	-	-	-
f.	TOD strategy along the Yellow BRT corridor alignment and area of influence	1.0	140.0	1.0	140.0	-	-	-	-
g.	TA – PPP Transaction Advisory Services	0.5	70.0	0.5	70.0	-	-	-	-
h.	Stakeholder engagement, public	1.0	140.0	1.0	140.0	-	-	-	-

Project Costs	(million)		IBRD Share		GoS Share		Private Sector Share	
	Total		Total		Total		Total	
	USD \$	PKR	USD \$	PKR	USD \$	PKR	USD \$	PKR
relation and media strategy								
i. Physical Contingencies ³	8.0	1,126.8	8.0	1,126.8	-	-	-	-
j. Price Contingencies ⁴	8.9	1,249.6	8.9	1,249.6	-	-	-	-
3 Capacity Building and Technical Assistance	6.0	840.0	5.0	700.0	1.0	140.0	-	-
a. Project Management	2.0	280.0	1.0	140.0	1.0	140.0	-	-
b. TA – Traffic management and Road Safety	1.0	140.0	1.0	140.0	-	-	-	-
c. TA – Regional Transport Authority	1.0	140.0	1.0	140.0	-	-	-	-
d. Capacity building to SMTA and Institutional Strengthening	2.0	280.0	2.0	280.0	-	-	-	-
Front End Fee (0.25% of IBRD loan)	1.0	133.9	-	-	1.0	133.9	-	-
Total Project Cost (1+2+3 + FEF)	438.8	61,435.8	382.4	53,540.1	18.9	2,645.7	37.5	5,250.0

Imprecision in totals may exist due to decimal rounding

¹ Equivalent currency

² To be financed by the Government of Sindh

³ Physical contingencies computed at 5% for civil works (excluding utilities' relocation) and equipment.

⁴ Price contingencies computed at, on average, 1.525% on foreign exchange costs and 4.825% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate. Price contingencies' computation is based on expected cumulative inflation over the implementation period, such as follows:

Escalation Rates for Price Contingency Calculation:

Item	2018	2019	2020	2021	Average
Foreign rate of price inflation	1.5%	1.5%	1.5%	1.6%	1.525%
Domestic rate of price inflation	4.5%	4.8%	5.0%	5.0%	4.825%

ANNEXURE-VI
Environmental Management Plan
(Cost Breakup)

Table 11: Tentative Yearly Budget for Environmental Management

S. No.	Cost Head	Unit Cost	No. of Units	Total Amount (PKR)
A - Environmental Assessment				
1	EIA study, public hearing, SEPA fee, baseline environmental monitoring	Lump Sum		5,000,000
Total-A				5,000,000
B - Construction Phase CPEMP Implementation				
2	Fixed cost at project site (fire safety equipment, septic tanks, installation of noise barriers, and environmental monitoring equipment)	Lump Sum		2,000,000
3	Monthly operational cost (PPE, first aid, solid waste management, water sprinkling, traffic management, restoration of camp sites etc.) for one year	200,000	12	2,400,000
Total-B				4,400,000
C - Operational Phase EMP Implementation				
4	Fixed cost (PPE, fire safety equipment, monitoring equipment, waste bins, spill kits, first aid boxes, waste collection system, storage area, sound proof canopies etc.)	Lump Sum		10,000,000
5	Monthly operational cost (PPE, solid waste management, wastewater treatment, fire safety equipment etc.) for one year	3,000,000	12	36,000,000
Total-C				46,000,000
D -Training				
6	Training cost (EMF) for 5 trainings	500,000	5	2,500,000
Total-D				2,500,000
E - Third Party Validation Cost				
7	Third party validation cost (For One Year)	1,000,000	12	12,000,000
Total-E				12,000,000
F - Operation of Project Team				
8	Project Team Cost (For One Year) (Salary of Environmental Engineer, Environmental Scientist, and Operational expenses of the team)	1,000,000	12	12,000,000
Total-F				12,000,000
Grand Total (A+B+C+D+E+F)				81,900,000

ANNEXURE-VII
Compensation and Livelihood
Rehabilitation Plan
(Cost Breakup)

1 The compensation, rehabilitation of income and livelihood is considered as an integral component of project costs and will be accordingly estimated and included in the project PC-1 to ensure adequate funds are made available. The implementation of rehabilitation and income restoration measures the SMTA can request World Bank to consider financing rehabilitation and income restoration component of the C&LRP. The allocation and provision of the financial resource is responsibility of the SMTA including freeing ROW from encumbrances, payment of compensation and implementation of income restoration measures.

2 The rehabilitation assistance is PKR 29.8 million. Of this total amount, PKR 28.9 million (USD 0.21 million) is required for the income losses for the transition period of informal vendors/ employees and vulnerability allowance to vulnerable AHs of PKR 0.91 million will be spent as provided in tables 12 and 13.

Table 12: Rehabilitation Assistance for Loss of Business

S. No.	Type of Business	No. of PAPs	Total Compensation (PKR)
1	Mobile Cart	27	8,100,000
2	Temporary Kiosks	23	7,632,000
3	Business on Footpath	13	3,288,000
4	Shops Display Material within the ROW	11	3,912,000
5	Tuck Shops under overhead bridge	4	1,020,000
6	Plant Nurseries	4	3,120,000
	Sub-total	82	27,072,000
7	Employees	38	1,824,000
	Grand Total		28,896,000

Table 13: Compensation for Vulnerable PAPs

S. No.	Vulnerability Type	No. of PAPs	Total Compensation (PKR)
1	Below OPL ≤16,000/month	16	768,000
2	Disabled	3	144,000
	Total	19	912,000

3 The following Table 14 shows the costs of each affected item and summarizes the total budget of this Addendum.

Table 14: Proposed Indicative Resettlement Budget

S. No.	Description	Affected	Rate (PKR)	Total Compensation (PKR)	Total Compensation (PKR Million)
1	Rehabilitation Assistance for Loss of Business	82	As per Income	27,024,000	27.02
2	Employment Loss	38	48,000	1,824,000	1.82
Sub-total				28,848,000	28.85
Vulnerability Allowances					-
3	BPL (16,000)	16	48,000	768,000	0.77
4	Disabled	3	48,000	144,000	0.14
Sub-total				912,000	0.91
Total				29,760,000	29.76
M&E @ 5% of the total cost				1,488,000	1.49
Administrative charges @ 1% of the total cost				297,600	0.30
Total				31,545,600	31.55
Contingencies @ 15% of the total cost				4,731,840	4.73
Grand Total				36,277,440	36.28

4 SMTA will ensure that (a) the ROW required for the Project under the Investment is made available in a timely manner; (b) compensation at rehabilitation assistance is provided prior to the award of relevant civil works contracts; and (c) Compensation is carried out in accordance with the C&LRP agreed upon between SMTA and WB, the relevant national and local policies on resettlement and rehabilitation, and WB OP 4.12. The C&LRP will be updated in line with the detailed engineering design and prior to the award of civil works contracts. Similarly, revised C&LRP based on detailed design will also be provided to WB approval prior to the award of related civil works contracts.

ANNEXURE–VIII

Implementation Schedule

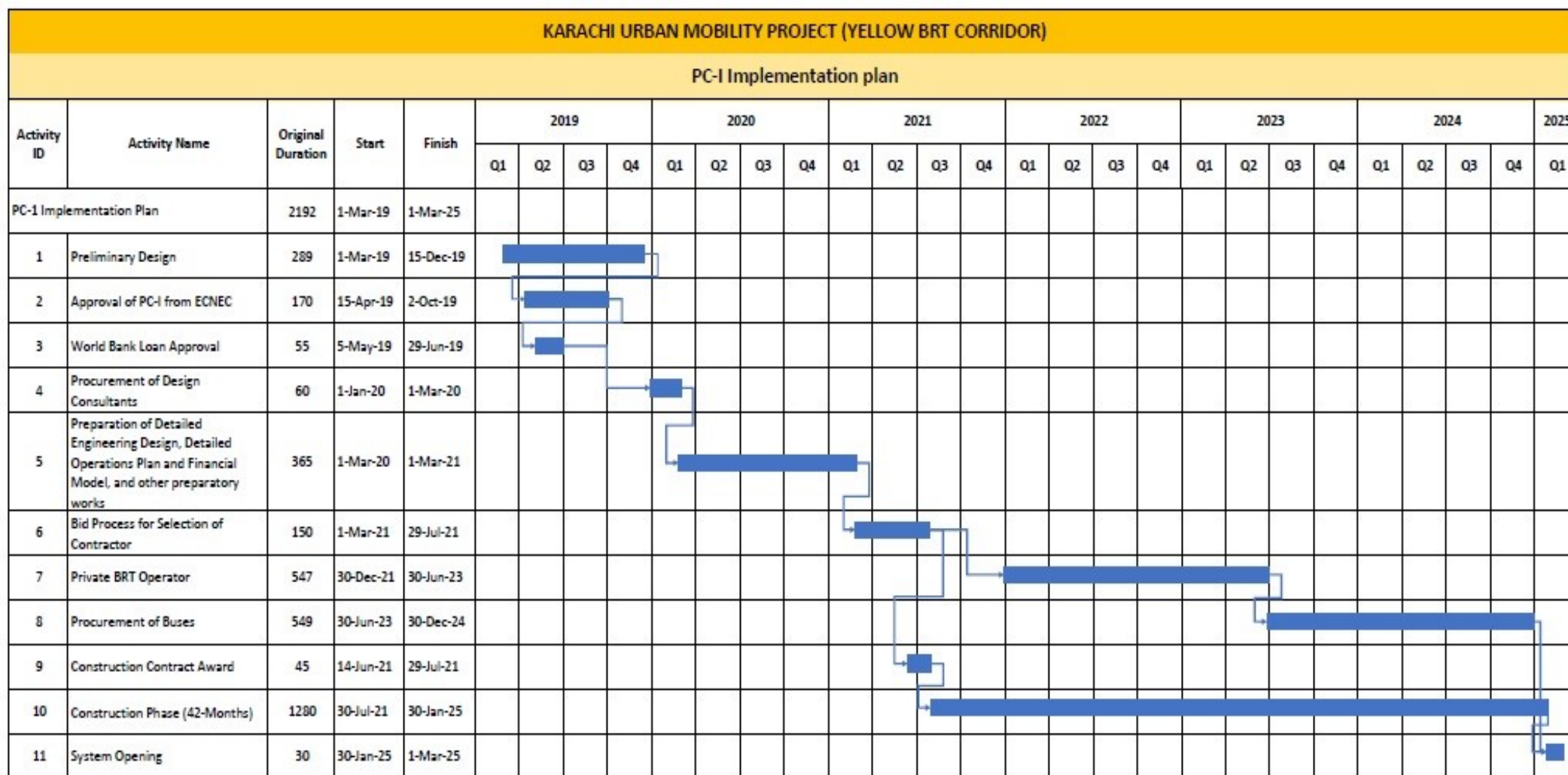


Figure-8: Project Implementation Plan